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(54) **SYSTEM AND METHOD FOR PROVIDING ENHANCED GRAPHICS IN A VIDEO ENVIRONMENT**

(75) Inventors: **John M. Kanalakis, Jr.**, San Jose, CA (US); **Zachary R. Bean**, Milpitas, CA (US); **David J. Mackie**, San Jose, CA (US); **Eddie Collins**, San Jose, CA (US); **Mark David Dyer**, San Jose, CA (US)

(73) Assignee: **CISCO TECHNOLOGY, INC.**, San Jose, CA (US)

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(58) **Field of Classification Search**

None

See application file for complete search history.

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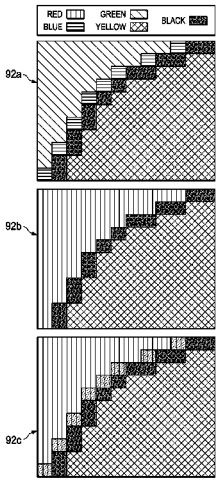
Primary Examiner — Edward Martello

(74) *Attorney, Agent, or Firm* — Patent Capital Group

(57) **ABSTRACT**

A method is provided in one example and includes receiving a video input from a video source coupled to a display configured for rendering a user interface thereon; generating a grayscale element associated with the user interface by evaluating alpha values related to pixels associated with the video input; generating an opacity mask; and setting red, green, blue (RGB) values equal to an alpha value of a source image for certain pixels in the source image.

20 Claims, 14 Drawing Sheets



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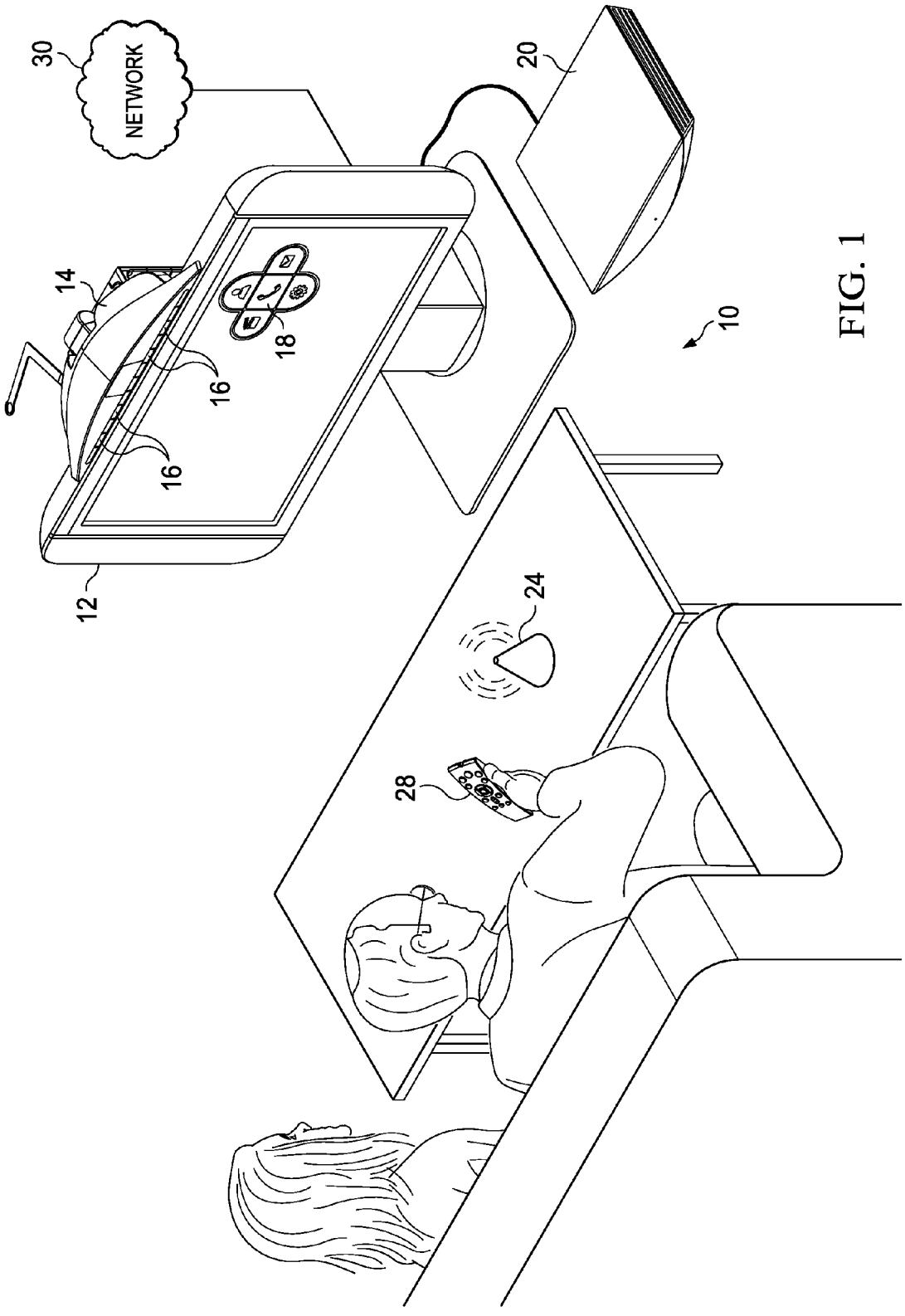

FIG. 1

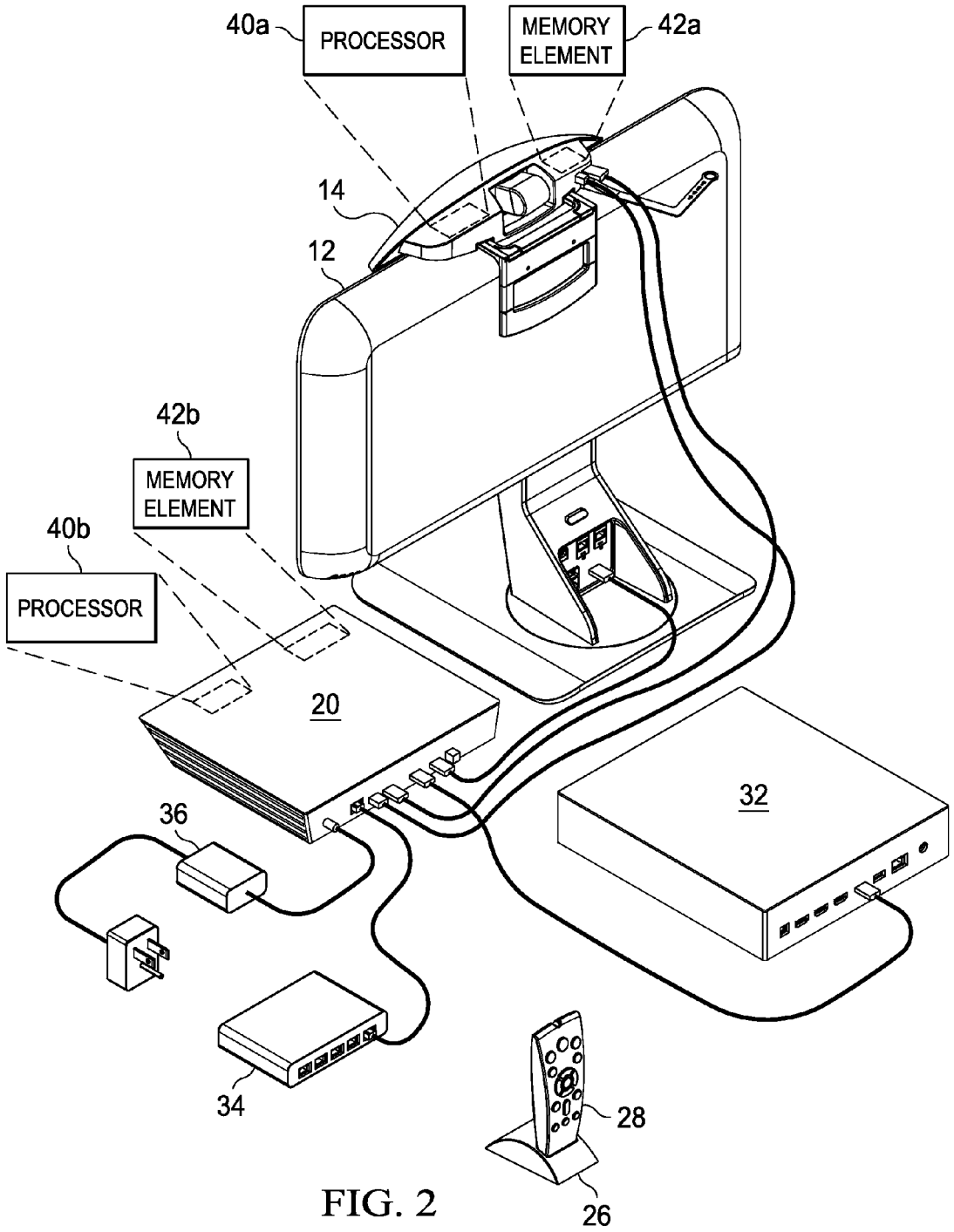
40a
PROCESSOR
MEMORY ELEMENT
42a
14
12
42b
MEMORY ELEMENT
40b
PROCESSOR
20
32
36
34
28
26

FIG. 2

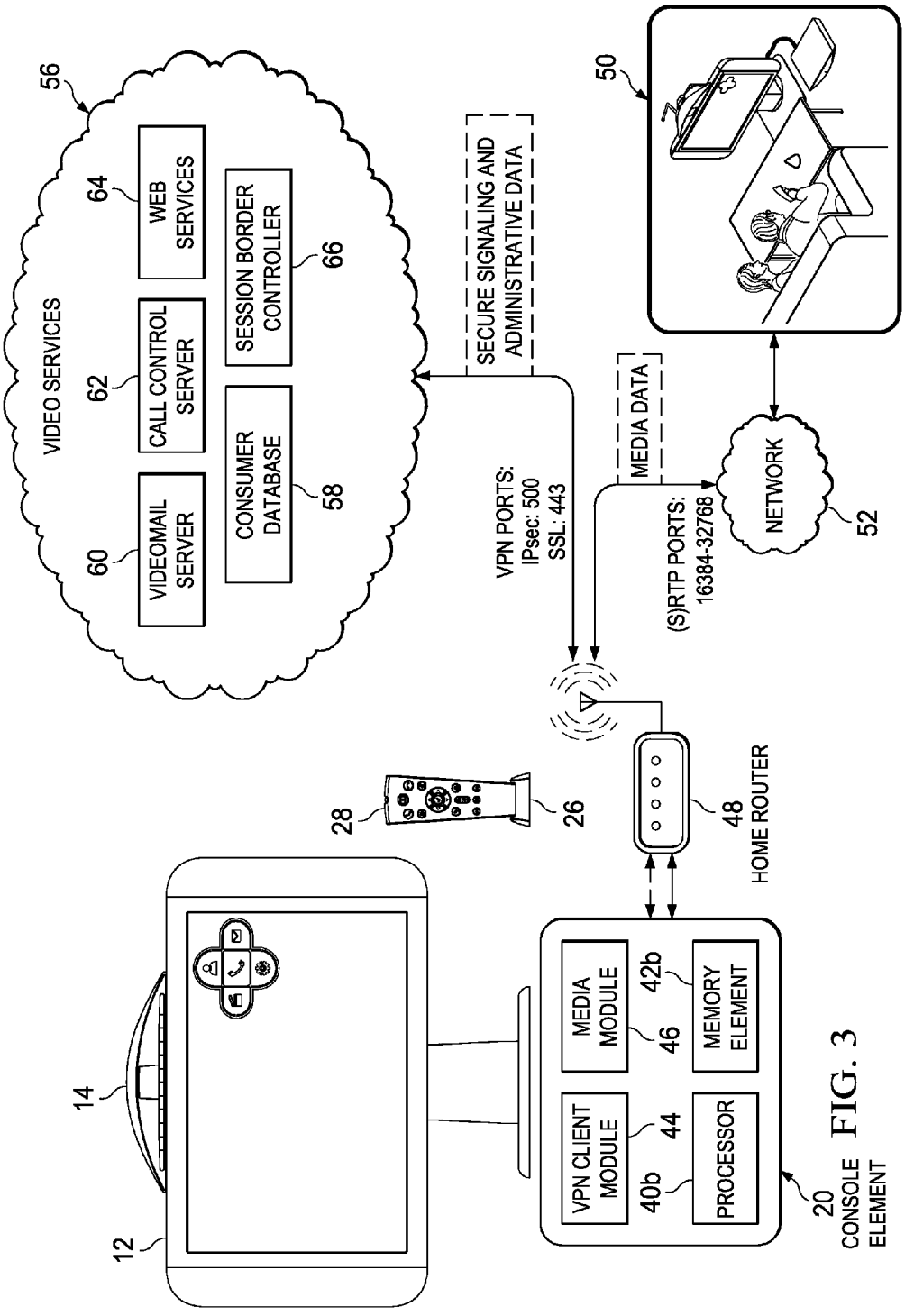
56
VIDEO SERVICES
64
WEB SERVICES
62
CALL CONTROL SERVER
66
SESSION BORDER CONTROLLER
60
VIDEOMAIL SERVER
CONSUMER DATABASE
58
SECURE SIGNALING AND ADMINISTRATIVE DATA
50
MEDIA DATA
VPN PORTS: IPsec: 500 SSL: 443
(S)RTP PORTS: 16384-32768
NETWORK
52
28
26
48
HOME ROUTER
14
12
VPN CLIENT MODULE
40b
44
MEDIA MODULE
46
42b
MEMORY ELEMENT
PROCESSOR
20
CONSOLE ELEMENT

FIG. 3

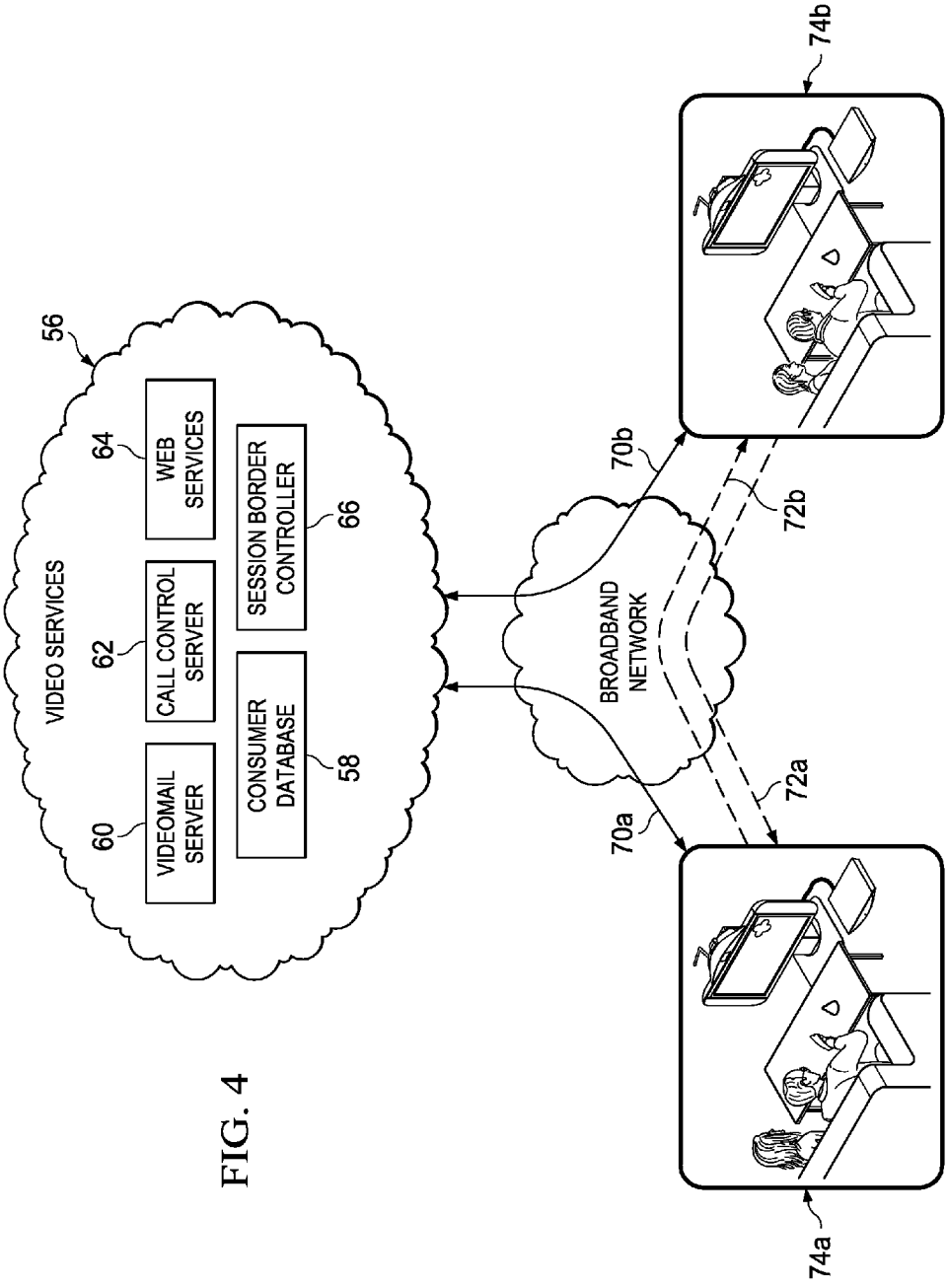
56
VIDEO SERVICES
64
WEB SERVICES
62
CALL CONTROL SERVER
66
SESSION BORDER CONTROLLER
60
VIDEOMAIL SERVER
CONSUMER DATABASE
58
BROADBAND NETWORK
70b
72b
70a
72a
74b
74a

FIG. 4

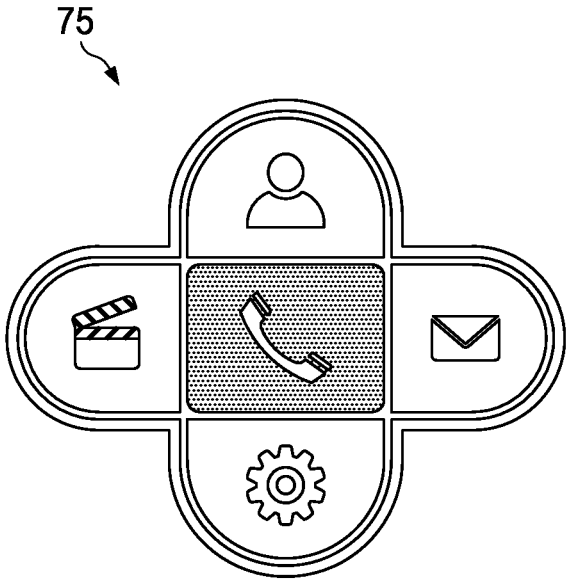

FIG. 5

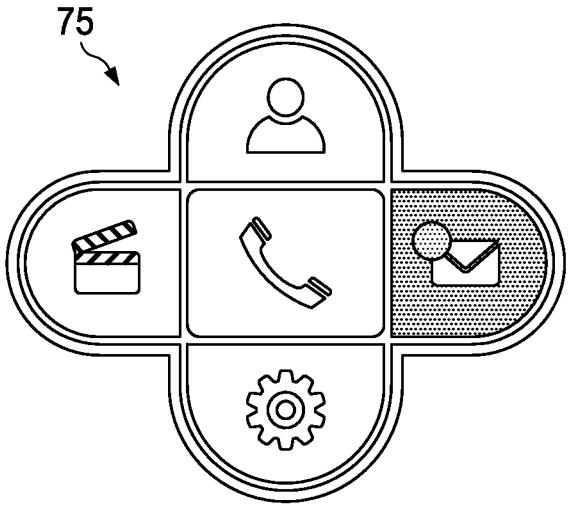

FIG. 6

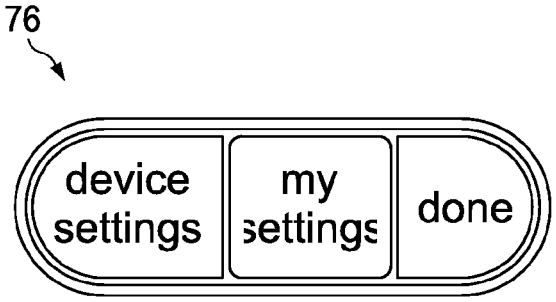

FIG. 7

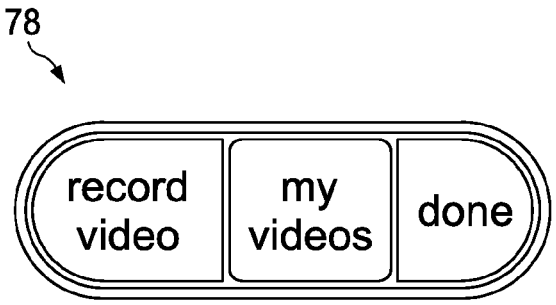

FIG. 8

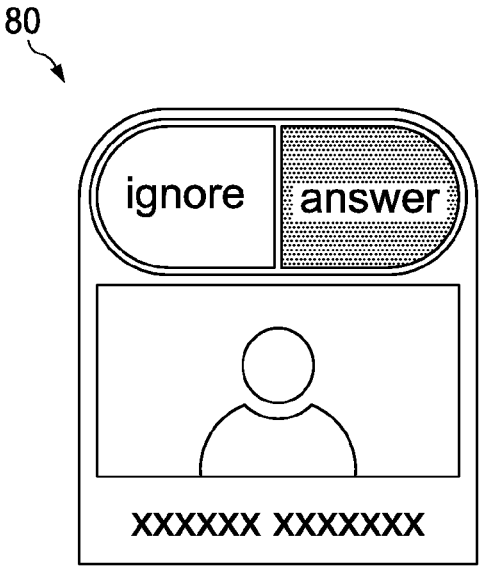

FIG. 9

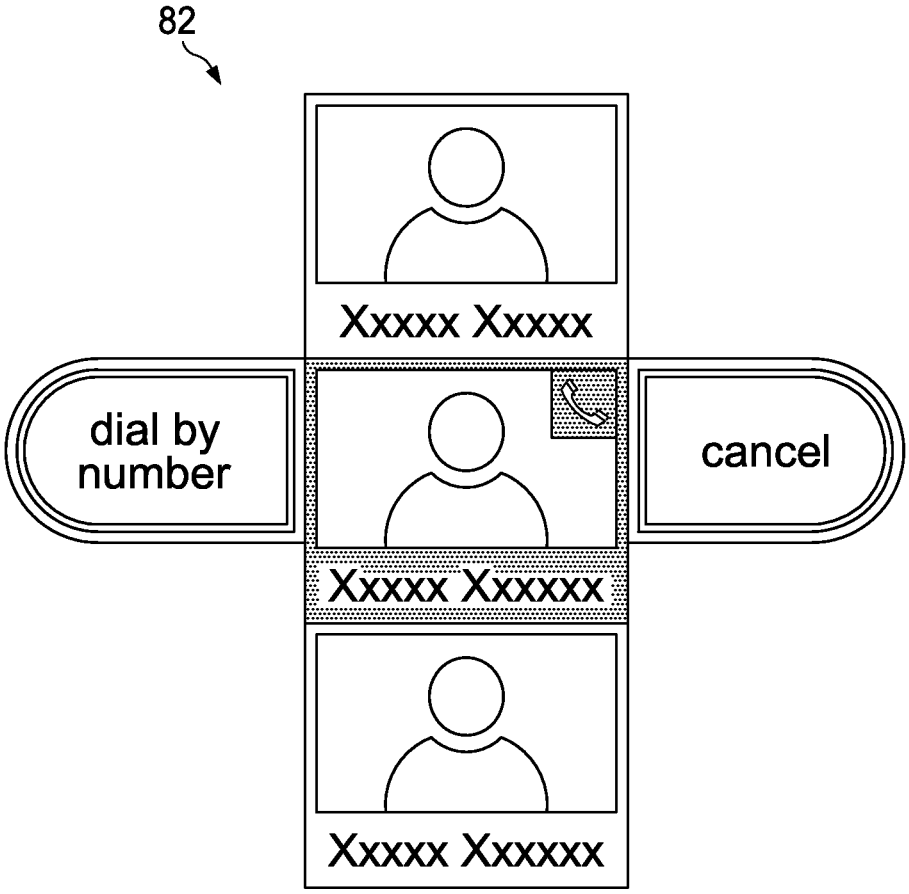
82
Xxxxx Xxxxx
dial by number
cancel
Xxxxx Xxxxxx
Xxxxx Xxxxxx

FIG. 10

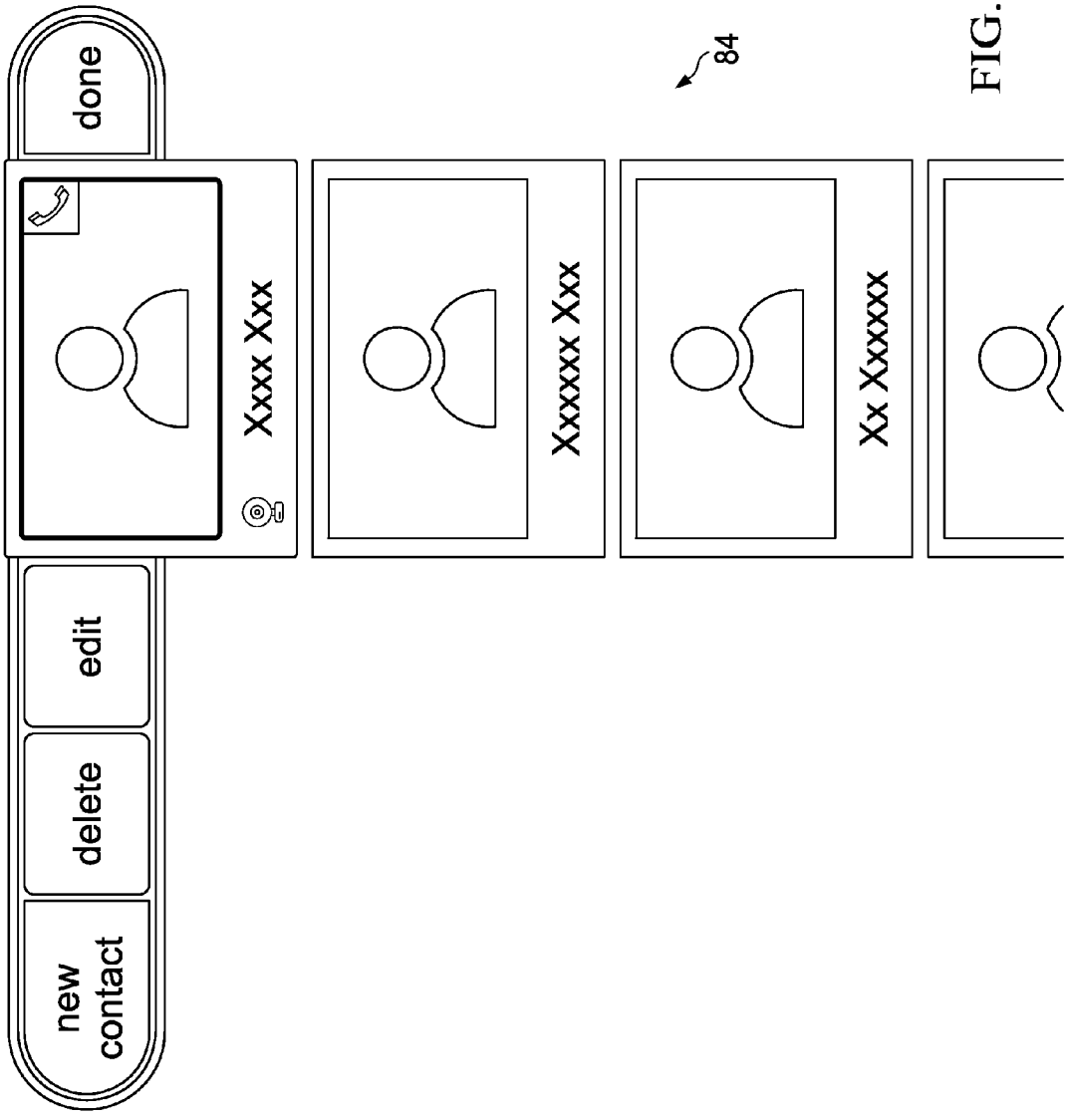

FIG. 11

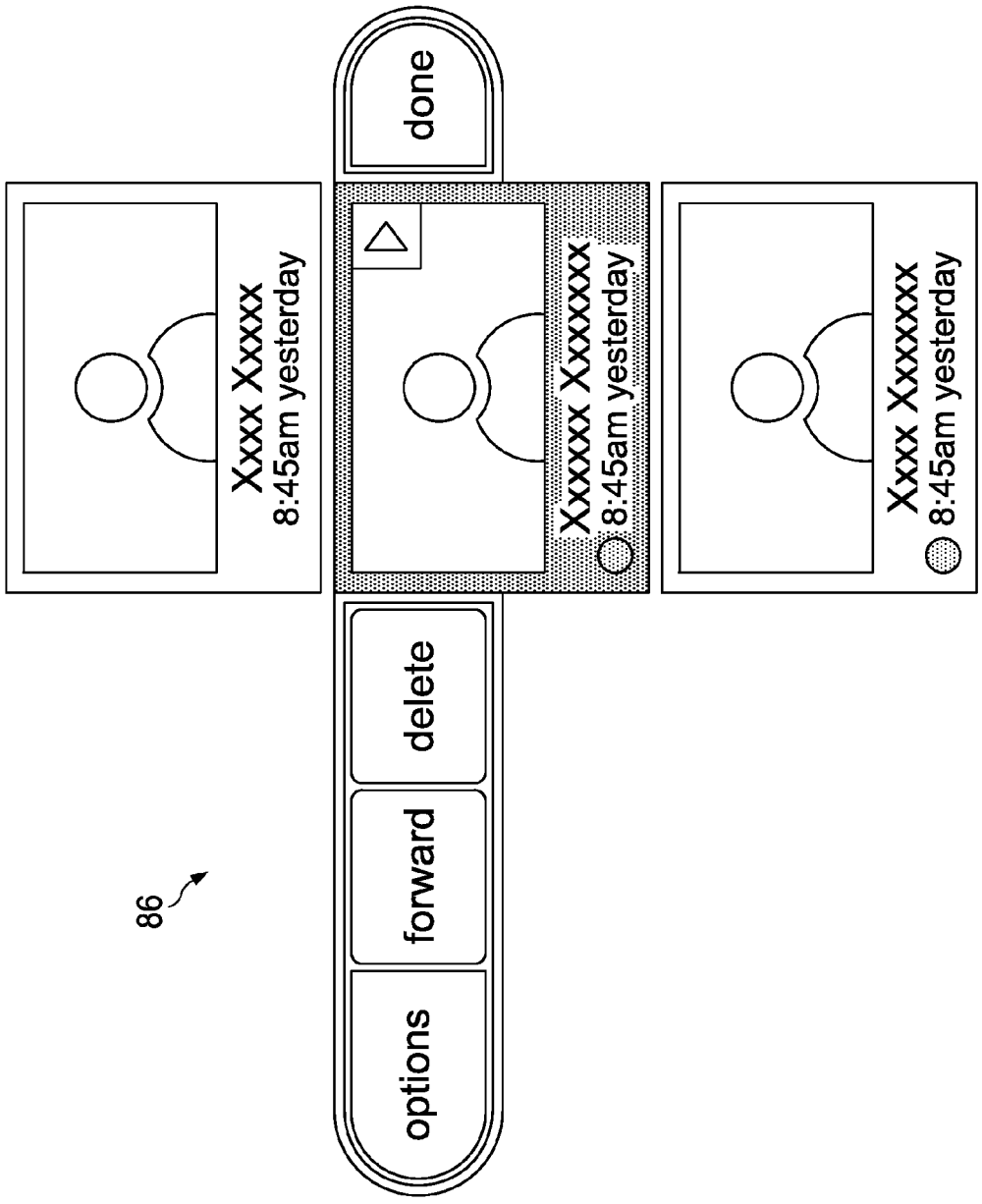
done
Xxxx Xxxxx
8:45am yesterday
Xxxxx Xxxxxx
8:45am yesterday
Xxxx Xxxxxx
8:45am yesterday
delete
forward
options
86

FIG. 12

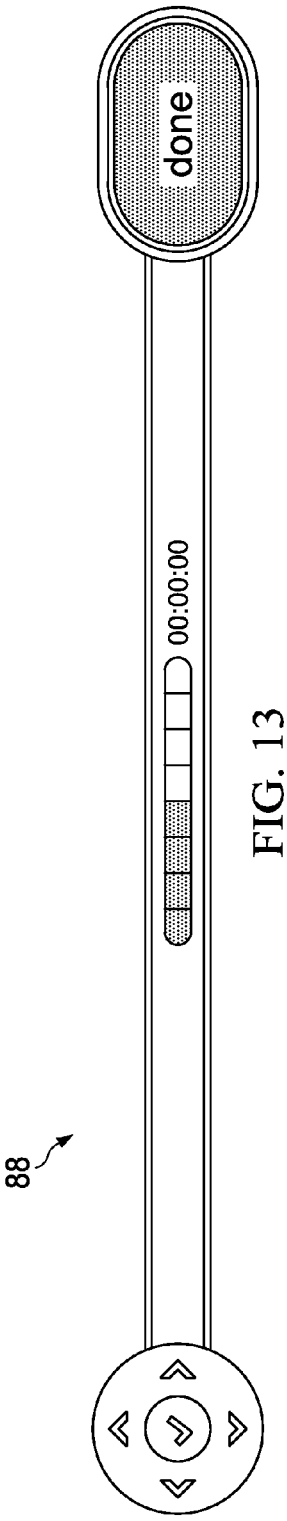
done
00:00:00
88

FIG. 13

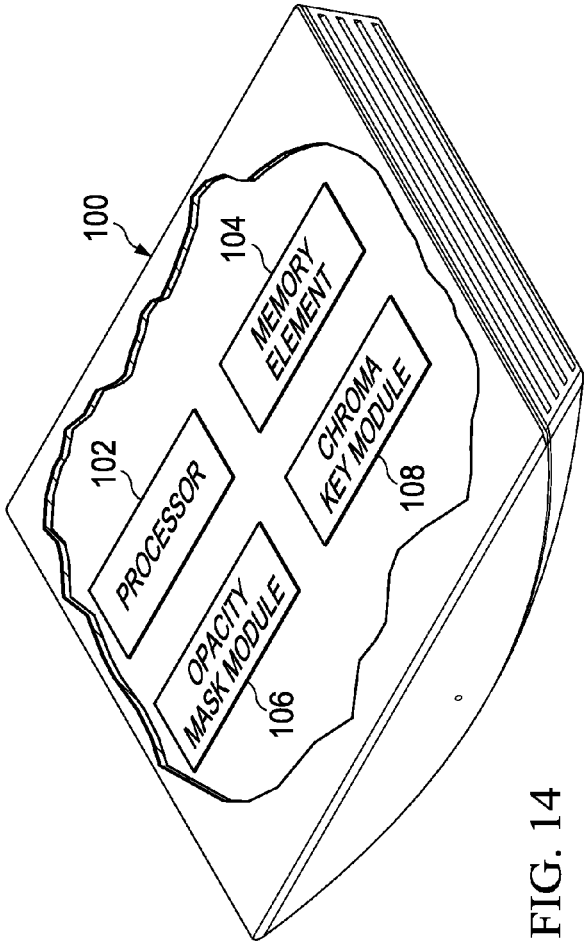
100
104
MEMORY ELEMENT
102
PROCESSOR
CHROMA KEY MODULE
108
OPACITY MASK MODULE
106

FIG. 14

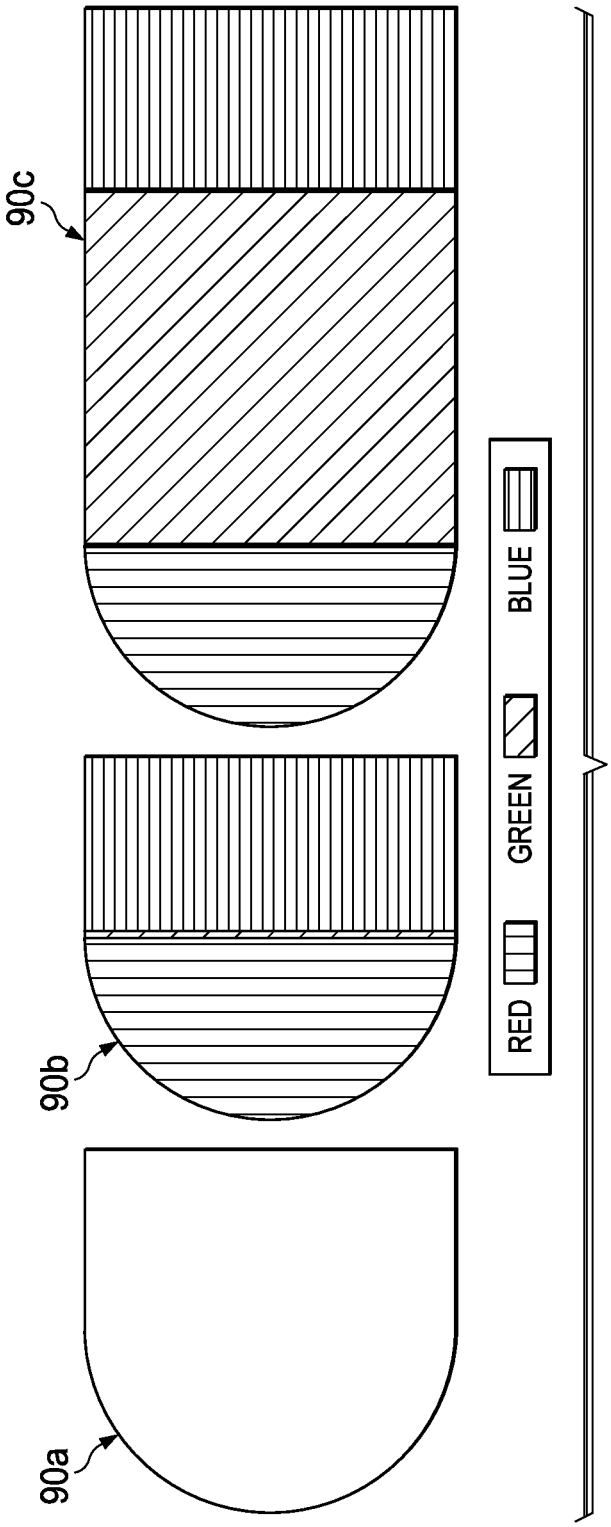

FIG. 15

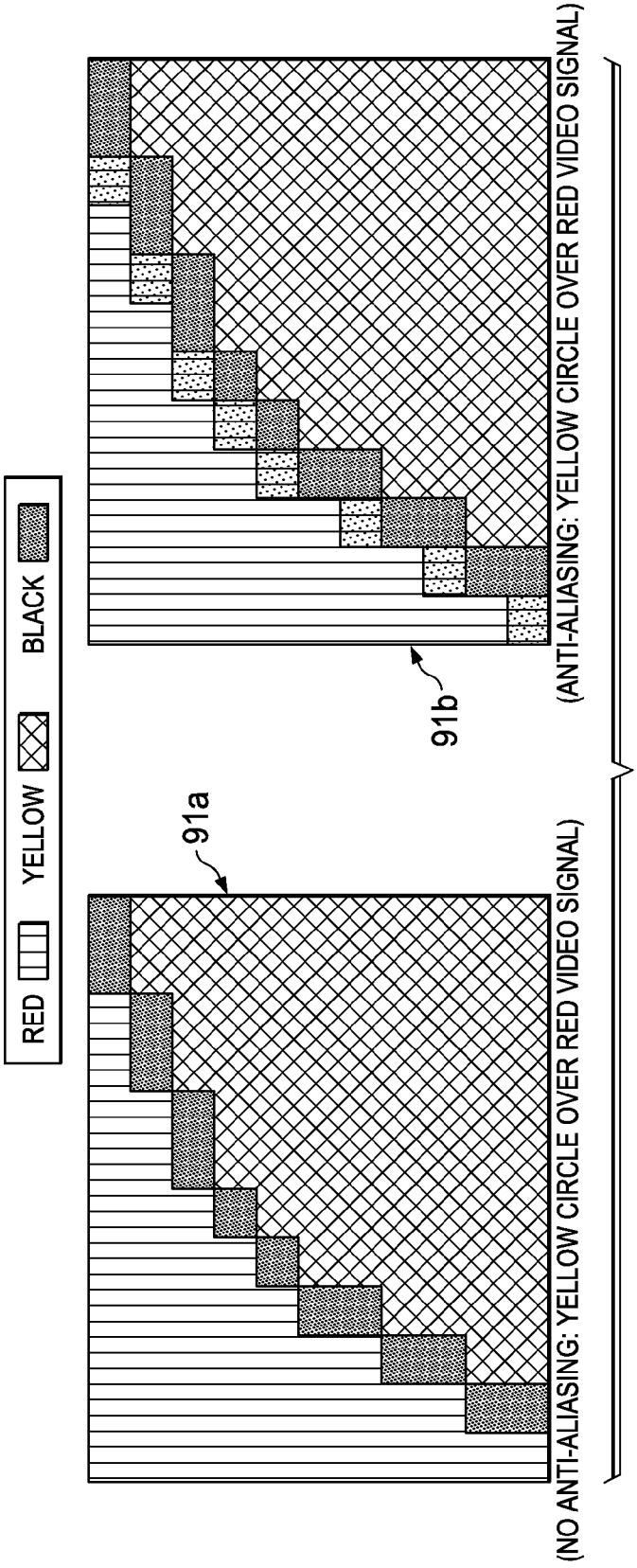
RED
YELLOW
BLACK
91a
91b
(NO ANTI-ALIASING: YELLOW CIRCLE OVER RED VIDEO SIGNAL)
(ANTI-ALIASING: YELLOW CIRCLE OVER RED VIDEO SIGNAL)

FIG. 16

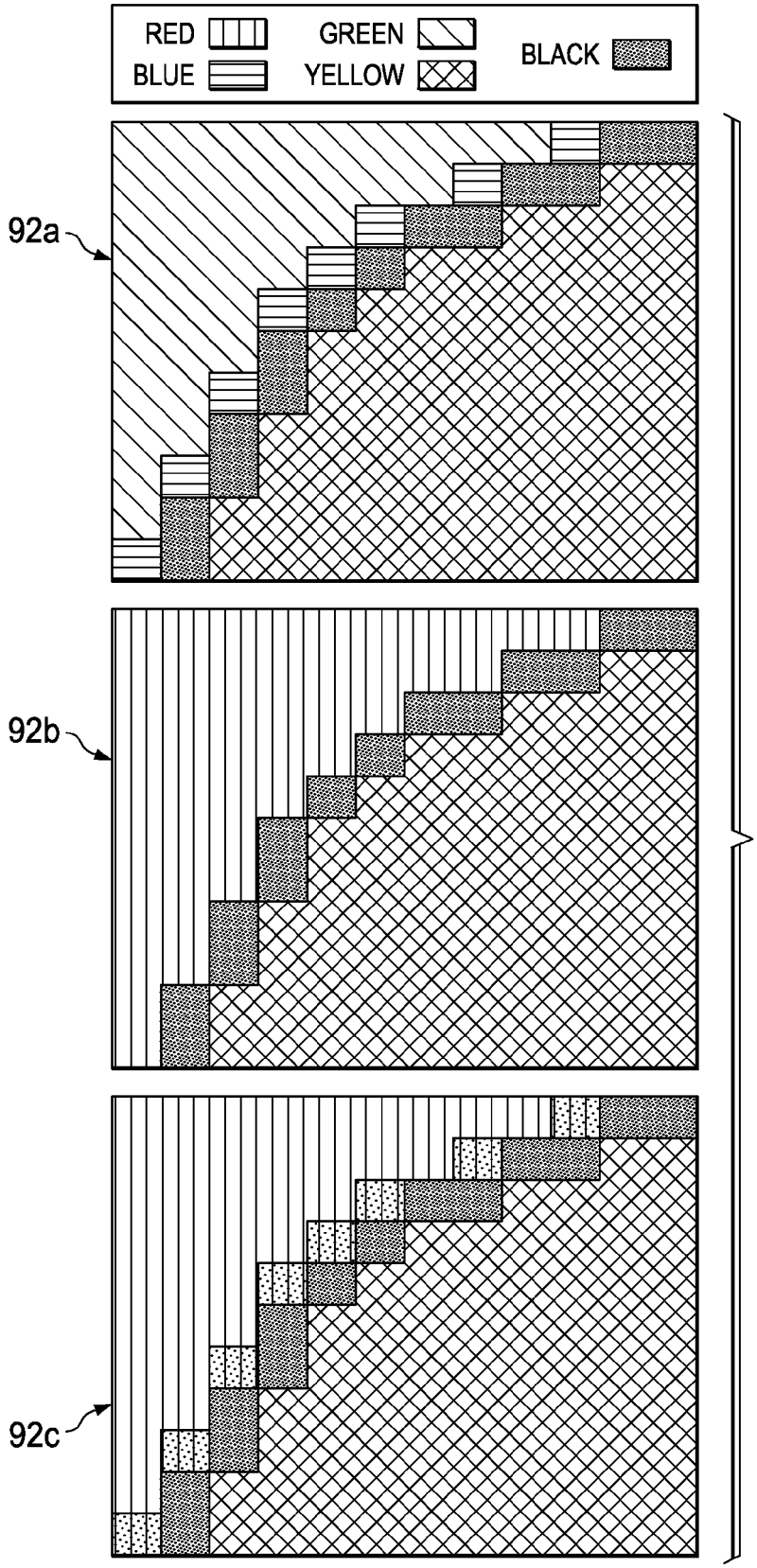

FIG. 17

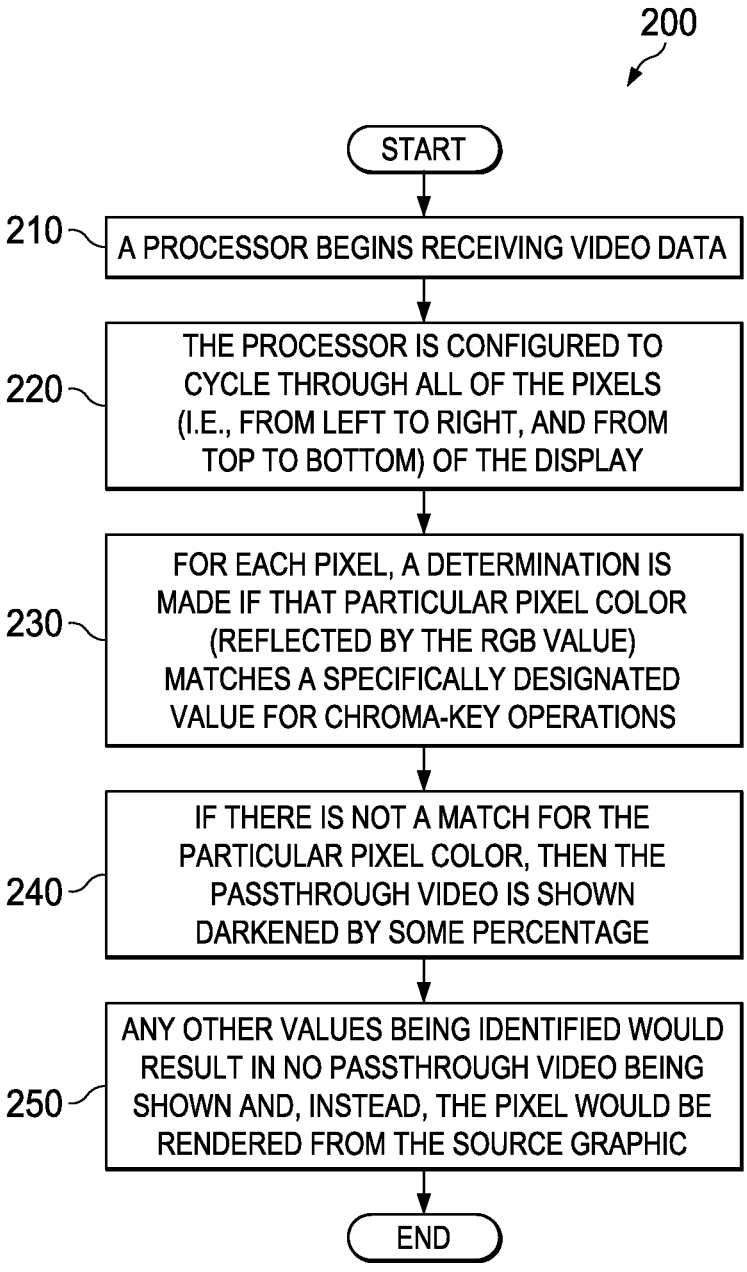
200
START
210
A PROCESSOR BEGINS RECEIVING VIDEO DATA
220
THE PROCESSOR IS CONFIGURED TO CYCLE THROUGH ALL OF THE PIXELS (I.E., FROM LEFT TO RIGHT, AND FROM TOP TO BOTTOM) OF THE DISPLAY
230
FOR EACH PIXEL, A DETERMINATION IS MADE IF THAT PARTICULAR PIXEL COLOR (REFLECTED BY THE RGB VALUE) MATCHES A SPECIFICALLY DESIGNATED VALUE FOR CHROMA-KEY OPERATIONS
240
IF THERE IS NOT A MATCH FOR THE PARTICULAR PIXEL COLOR, THEN THE PASSTHROUGH VIDEO IS SHOWN DARKENED BY SOME PERCENTAGE
250
ANY OTHER VALUES BEING IDENTIFIED WOULD RESULT IN NO PASSTHROUGH VIDEO BEING SHOWN AND, INSTEAD, THE PIXEL WOULD BE RENDERED FROM THE SOURCE GRAPHIC
END

FIG. 18

SYSTEM AND METHOD FOR PROVIDING ENHANCED GRAPHICS IN A VIDEO ENVIRONMENT

TECHNICAL FIELD

This disclosure relates in general to the field of communications and, more particularly, to providing enhanced graphics in a video environment.

BACKGROUND

Video services have become increasingly important in today's society. In certain architectures, service providers may seek to offer sophisticated video conferencing services for their end users. The video conferencing architecture can offer an "in-person" meeting experience over a network. Video conferencing architectures can deliver real-time, face-to-face interactions between people using advanced visual, audio, and collaboration technologies. The ability to optimize video communications provides a significant challenge to system designers, device manufacturers, and service providers alike.

BRIEF DESCRIPTION OF THE DRAWINGS

To provide a more complete understanding of the present disclosure and features and advantages thereof, reference is made to the following description, taken in conjunction with the accompanying figures, wherein like reference numerals represent like parts, in which:

FIG. **1** is a simplified block diagram of a system for providing a video session in a network environment in accordance with one embodiment of the present disclosure;

FIG. **2** is a simplified block diagram illustrating one example implementation of certain components associated with the system;

FIG. **3** is a simplified block diagram illustrating one example implementation of network traffic management associated with the system;

FIG. **4** is a simplified block diagram illustrating another example implementation of network traffic management associated with the system;

FIGS. **5-13** are simplified screenshots illustrating certain features associated with a user interface to be used for conducting a video session;

FIG. **14** is a simplified block diagram illustrating one possible implementation of a console element;

FIGS. **15-17** are simplified graphical illustrations depicting certain video graphics associated with the present disclosure; and

FIG. **18** is a simplified flowchart illustrating one example operation associated with the present disclosure.

DETAILED DESCRIPTION OF EXAMPLE EMBODIMENTS

Overview

A method is provided in one example and includes receiving a video input from a video source coupled to a display configured for rendering a user interface thereon; generating a grayscale element associated with the user interface by evaluating alpha values related to pixels associated with the video input; generating an opacity mask; and setting red, green, blue (RGB) values equal to an alpha value of a source image for certain pixels in the source image.

In more specific implementations, the grayscale element is generated by evaluating an alpha value for each pixel associated with the user interface. In yet other embodiments, if a particular alpha value of a particular pixel is 0, then a portion of an associated grayscale image contains a black pixel. If a particular alpha value of a particular pixel is 255, then a portion of an associated grayscale image contains a white pixel.

In other implementations, the method can include setting a selected pixel to a certain color in red, green, blue, alpha (RGBA) values to indicate to a processor element a presence of the opacity mask. Additionally, the method can include evaluating graphics associated with the user interface for a RGBA color to determine whether to render the graphics on the display. More specifically, certain images are used as part of the opacity mask to mix source video with the user interface. Pixels determined to be black show passthrough video on the display, and pixels determined to be white show solid user interface pixel color on the display.

Example Embodiments

Turning to FIG. **1**, FIG. **1** is a simplified block diagram of a system **10** for providing a video session in a network environment. In this particular example, system **10** may include a display **12**, a camera element **14**, a user interface (UI) **18**, a console element **20**, a handset **28**, and a network **30**. A series of speakers **16** are provisioned in conjunction with camera element **14** in order to transmit and receive audio data. In one particular example implementation, a wireless microphone **24** is provided in order to receive audio data in a surrounding environment (e.g., from one or more audience members). Note that this wireless microphone **24** is purely optional, as speakers **16** are capable of sufficiently capturing audio data in a surrounding environment during any number of videoconferencing applications (which are detailed below).

In general terms, system **10** can be configured to capture video image data and/or audio data in the context of videoconferencing. System **10** may include a configuration capable of transmission control protocol/internet protocol (TCP/IP) communications for the transmission and/or reception of packets in a network. System **10** may also operate in conjunction with a user datagram protocol/IP (UDP/IP) or any other suitable protocol, where appropriate and based on particular communication needs.

In certain implementations, handset **28** can be used as a remote control for system **10**. For example, handset **28** can offer a wireless remote control that allows it to communicate with display **12**, camera element **14**, and/or console element **20** via a wireless network link (e.g., infrared, Bluetooth, any type of IEEE 802.11-based protocol, etc.). Handset **28** can further be provisioned as a wireless mobile phone (e.g., a speakerphone device) with various dial pads: some of which are shown by way of example in FIG. **1**. In other implementations, handset **28** operates as a learning mechanism and/or a universal remote controller, which allows it to readily control display **12**, camera element **14**, console element **20**, and/or any audiovisual (AV) receiver device (e.g., managing functions such as ON/OFF, volume, input select, etc. to enhance the overall video experience). In a particular set of examples, a specific button on handset **28** can launch UI **18** for navigating through any number of options provided in submenus of the UI software. Additionally, a dedicated button can be used to make/answer calls, end calls, turn on/off camera element **14**, turn on/off the microphone on, turn on/off console ele-

ment **20**, etc. Furthermore, a set of playback controls can be provided on handset **28** in order to control the video data being rendered on display **12**.

Note that handset **28** can be configured to launch, control, and/or manage UI **18**. In one particular instance, UI **18** includes a clover design having four separate functions along its perimeter (i.e., up, down, left, right). The center of UI **18** can be used to initiate calls or to configure call options. The lower widget icon may be used to adjust settings, inclusive of controlling profile information, privacy settings, console settings, etc. The right-hand icon (when selected) can be used to view video messages sent to a particular user. The upper icon can be used to manage contacts (e.g., add, view, and connect to other individuals). The director's card (provided as the left icon) can be used to record and send video messages to other individuals. It is imperative to note that these menu choices can be changed considerably without departing from the scope of the present disclosure. Additionally, these icons may be customized, changed, or managed in any suitable fashion. Furthermore, the icons of UI **18** are not exhaustive, as any other suitable features may be provided in the context of UI **18**. Along similar lines, the submenu navigation choices provided beneath each of these icons can include any suitable parameter applicable to videoconferencing, networking, user data management, profiles, etc.

In operation of an example implementation, system **10** can be used to conduct video calls (e.g., supporting both inbound and outbound directional call flows). For the inbound call scenario, on reception of an inbound call request, console element **20** is configured to contact the paired handset(s) **28** (e.g., waking it from sleep, where appropriate). Handset **28** can be configured to play a ringtone, turn on an LED indicator, and/or display UI **18** (e.g., including the incoming caller's contact information). If configured to do so, UI **18** can also be displayed over any passthrough video sources on console element **20**. If the callee chooses to answer the call with one of the call control buttons, console element **20** offers its media capabilities to the caller's endpoint. In certain example implementations, by default, audio media can be offered at the start of the call. At any time during a voice call, both parties can agree to enter into a full video session (e.g., referred to as a "go big" protocol) at which point video media is negotiated. As a shortcut, the intention to "go big" can be pre-voted at the start of the call. At any time after video media is flowing, the call can also be de-escalated back to an audio-only call. In certain instances, there could be an option to automatically answer incoming calls as immediate full-video sessions.

In the case of an ad hoc outbound call, the user can select a callee from their contact list, select a callee via a speed dial setting, or alternatively the user can enter any type of identifier (e.g., a telephone number, a name, a videoconferencing (e.g., Telepresence, manufactured by Cisco, Inc. of San Jose, Calif.) number directly). If the callee answers, the call scenario proceeds, similar to that of an inbound call. In the case of a hold and resume scenario, an in-call UI **18** signal can be provided to put a call on hold, and subsequently the call can be resumed at a later time. Note that in other instances, system **10** can be used to execute scheduled calls, call transfer functions, multipoint calls, and/or various other conferencing capabilities.

In the case of the consumer user attempting a communication with a business entity, certain parameters may be changed based on interoperability issues. For example, secure business endpoints may be supported, where signaling and media would be secure (both audio and video). Appropriate messages can be displayed in UI **18** to inform the user of the reason for any security-forced call drops. Signaling can be considered secure by having both a business exchange and consumer networks physically co-located, or by using a secure tunnel (e.g., a site-to-site virtual private network (VPN) tunnel) between the two entities.

Before turning to additional flows associated with system **10**, FIG. **2** is introduced in order to illustrate some of the potential arrangements and configurations for system **10**. In the particular example implementation of FIG. **2**, camera element **14** includes a processor **40***a* and a memory element **42***a*. Camera element **14** is coupled to console element **20**, which similarly includes a processor **40***b* and a memory element **42***b*. A power cord **36** is provided between an outlet and console element **20**. Any suitable connections (wired or wireless) can be used in order to connect any of the components of FIG. **2**. In certain examples, the cables used may include Ethernet cables, High-Definition Multimedia Interface (HDMI) cables, universal serial bus (USB) cables, or any other suitable link configured for carrying data or energy between two devices.

In regards to a physical infrastructure, camera element **14** can be configured to fasten to any edge (e.g., a top edge) of display **12** (e.g., a flat-screen HD television). Camera element **14** can be included as part of an integrated component (i.e., a single component, a proprietary element, a set-top box, console element **20**, etc.) that could include speakers **16** (e.g., an array microphone). Thus, all of these elements (camera element **14**, speakers **16**, console element **20**) can be combined and/or be suitably consolidated into an integrated component that rests on (or that is fixed to, or that is positioned near) display **12**. Alternatively, each of these elements are their own separate devices that can be coupled (or simply interact with each other), or be adequately positioned in any appropriate fashion.

Also provided in FIG. **2** are a router **34** and a set-top box **32**: both of which may be coupled to console element **20**. In a particular example, router **34** can be a home wireless router configured for providing a connection to network **30**. Alternatively, router **34** can employ a simple Ethernet cable in order to provide network connectivity for data transmissions associated with system **10**. Handset **28** can be recharged through a cradle dock **26** (as depicted in FIG. **2**). [Handset **28** can be functional while docked.] Alternatively, handset **28** may be powered by batteries, solar charging, a cable, or by any power source, or any suitable combination of these mechanisms.

In one particular example, the call signaling of system **10** can be provided by a session initiation protocol (SIP). In addition, the media for the videoconferencing platform can be provided by Secure Real-time Transport Protocol (SRTP), or any other appropriate real-time protocol. SRTP addresses security for RTP and, further, can be configured to add confidentiality, message authentication, and replay protection to that protocol. SRTP is preferred for protecting voice over IP (VoIP) traffic because it can be used in conjunction with header compression and, further, it generally has no effect on IP quality of service (QoS). For network address translation (NAT)/firewall (FW) traversal, any suitable mechanism can be employed by system **10**. In one particular example, these functions can be provided by a split-tunneled VPN with session traversal utilities for NAT (STUN) and Interactive Connectivity Establishment (ICE).

Signaling can propagate to a call agent via the VPN. Additionally, media can be sent directly from the endpoint to another endpoint (i.e., from one videoconferencing platform to another). Note that as used herein, the term 'media' is inclusive of audio data (which may include voice data) and video data (which may include any type of image data). The

video data can include any suitable images (such as that which is captured by camera element **14**, by a counterparty's camera element, by a Webcam, by a smartphone, by an iPad, etc.). The term 'smartphone' as used herein includes any type of mobile device capable of operating in conjunction with a video service. This would naturally include items such as the Google Droid, the iPhone, an iPad, etc. In addition, the term 'signaling data' is inclusive of any appropriate control information that can be sent toward a network. This may be inclusive of traffic used to establish a video session initially, along with any type of negotiations (e.g., for bit rates, for bandwidth, etc.) that may be appropriate for the particular videoconference. This may further be inclusive of items such as administrative traffic, account traffic (for user account management, contact lists [which include buddy lists, as detailed below], etc.), and/or other types of traffic, which are not provided as part of the media data.

In order to handle symmetric NAT, Traversal Using Relay NAT (TURN) can be used by system **10** in particular embodiments. User names for the videoconferencing platform can be provided by E.164 numbers in a particular example. Alternatively, the user naming can be a simple user ID (e.g., assigned by the service provider, selected by the user, etc.), a full name of the user (or a group name), an avatar, or any other symbol, number, or letter combination that can be used to distinguish one user from another. Note that a single name can also be associated with a group (e.g., a family, a business unit, etc.). The security for communications of system **10** can be addressed a number of ways. In one implementation, the video services (i.e., cloud services) can be protected by any suitable security protocol (e.g., security software, adaptive security appliances (ASA), etc.). Additionally, intrusion protection systems, firewalls, anti-denial of service mechanisms can be provided for the architecture (both out in the network, and/or locally within a residential environment).

Turning to details associated with the infrastructure of system **10**, in one particular example, camera element **14** is a video camera configured to capture, record, maintain, cache, receive, and/or transmit image data. This could include transmitting packets over network **30** to a suitable next destination. The captured/recorded image data could be stored in camera element **14** itself, or be provided in some suitable storage area (e.g., a database, a server, console element **20**, etc.). In one particular instance, camera element **14** can be its own separate network device and have a separate IP address. Camera element **14** could include a wireless camera, a high-definition camera, or any other suitable camera device configured to capture image data.

Camera element **14** may interact with (or be inclusive of) devices used to initiate a communication for a video session, such as a switch, console element **20**, a proprietary endpoint, a microphone, a dial pad, a bridge, a telephone, a computer, or any other device, component, element, or object capable of initiating video, voice, audio, media, or data exchanges within system **10**. Camera element **14** can also be configured to include a receiving module, a transmitting module, a processor, a memory, a network interface, a call initiation and acceptance facility such as a dial pad, one or more displays, etc. Any one or more of these items may be consolidated, combined, eliminated entirely, or varied considerably and those modifications may be made based on particular communication needs.

Camera element **14** can include a high-performance lens and an optical zoom, where camera element **14** is capable of performing panning and tilting operations. The video and the audio streams can be sent from camera element **14** to console element **20**, where they are mixed into the HDMI stream. In certain implementations, camera element **14** can be provisioned as a light sensor such that the architecture can detect whether the shutter of the camera is open or closed (or whether the shutter is partially open.) An application program interface (API) can be used to control the operations of camera element **14**.

Display **12** offers a screen on which video data can be rendered for the end user. Note that as used herein in this Specification, the term 'display' is meant to connote any element that is capable of delivering image data (inclusive of video information), text, sound, audiovisual data, etc. to an end user. This would necessarily be inclusive of any panel, plasma element, television (which may be high-definition), monitor, computer interface, screen, Telepresence devices (inclusive of Telepresence boards, panels, screens, surfaces, etc.), or any other suitable element that is capable of delivering/rendering/projecting such information.

Network **30** represents a series of points or nodes of interconnected communication paths for receiving and transmitting packets of information that propagate through system **10**. Network **30** offers a communicative interface between any of the components of FIGS. **1-2** and remote sites, and may be any local area network (LAN), wireless local area network (WLAN), metropolitan area network (MAN), wide area network (WAN), VPN, Intranet, Extranet, or any other appropriate architecture or system that facilitates communications in a network environment.

Console element **20** is configured to receive information from camera element **14** (e.g., via some connection that may attach to an integrated device (e.g., a set-top box, a proprietary box, etc.) that sits atop (or near) display **12** and that includes (or is part of) camera element **14**). Console element **20** may also be configured to control compression activities, or additional processing associated with data received from camera element **14**. Alternatively, the actual integrated device can perform this additional processing before image data is sent to its next intended destination. Console element **20** can also be configured to store, aggregate, process, export, or otherwise maintain image data and logs in any appropriate format, where these activities can involve processor **40***b* and memory element **42***b*. Console element **20** is a video element that facilitates data flows between endpoints and a given network. As used herein in this Specification, the term 'video element' is meant to encompass servers, proprietary boxes, network appliances, set-top boxes, or other suitable device, component, element, or object operable to exchange video information with camera element **14**.

Console element **20** may interface with camera element **14** through a wireless connection, or via one or more cables or wires that allow for the propagation of signals between these elements. These devices can also receive signals from an intermediary device, a remote control, handset **28**, etc. and the signals may leverage infrared, Bluetooth, WiFi, electromagnetic waves generally, or any other suitable transmission protocol for communicating data (e.g., potentially over a network) from one element to another. Virtually any control path can be leveraged in order to deliver information between console element **20** and camera element **14**. Transmissions between these two devices can be bidirectional in certain embodiments such that the devices can interact with each other. This would allow the devices to acknowledge transmissions from each other and offer feedback where appropriate. Any of these devices can be consolidated with each other, or operate independently based on particular configuration needs. In one particular instance, camera element **14** is intelligently powered using a USB cable. In a more specific

example, video data is transmitted over an HDMI link, and control data is communicated over a USB link.

In certain examples, console element **20** can have an independent light sensor provisioned within it to measure the lighting in a given room. Subsequently, the architecture can adjust camera exposure, shuttering, lens adjustments, etc. based on the light that is detected in the room. Camera element **14** is also attempting to provide this function; however, having a separate light sensor offers a more deterministic way of adjusting these parameters based on the light that is sensed in the room. An algorithm (e.g., within camera element **14** and/or console element **20**) can be executed to make camera adjustments based on light detection. In an IDLE mode, the lens of camera element **14** can close automatically. The lens of camera element **14** can open for an incoming call, and can close when the call is completed (or these operations may be controlled by handset **28**). The architecture can also account for challenging lighting environments for camera element **14**. For example, in the case of bright sunlight behind an individual, system **10** can optimize the exposure of the individual's face.

In regards to audio data (inclusive of voice data), in one particular example, speakers **16** are provisioned as a microphone array, which can be suitably calibrated. Note that in certain consumer applications, the consumer's home system is the variant, which is in contrast to most enterprise systems that have fixed (predictable) office structures. Camera element **14** can include an array of eight microphones in a particular example, but alternatively any number of microphones can be provisioned to suitably capture audio data. The microphones can be spaced linearly, or logarithmically in order to achieve a desired audio capture function. MicroElectrical-Mechanical System (MEMS) technology can be employed for each microphone in certain implementations. The MEMS microphones represent variations of the condenser microphone design, having a built in analog-to-digital converter (ADC) circuits.

The audio mechanisms of system **10** can be configured to add a delay to the system in order to ensure that the acoustics function properly. In essence, the videoconferencing architecture does not inherently know the appropriate delay because of the unique domain of the consumer. For example, there could be a home theater system being used for acoustic purposes. Hence, system **10** can determine the proper delay, which would be unique to that particular environment. In one particular instance, the delay can be measured, where the echoing effects from the existing speakers are suitably canceled. An embedded watermarking signature can also be provided in each of the speakers, where the signature can be detected in order to determine an appropriate delay. Note that there is also some additional delay added by display **12** itself because the clocking mechanism is generally not deterministic. The architecture can dynamically update the delay to account for this issue. Many of these functions can be accomplished by console element **20** and/or camera element **14**: both of which can be intelligently configured for performing these function adjustments.

The architecture can also send out a signal (e.g., white noise) as a test for measuring delay. In certain instances, this function is done automatically without having to prompt the user. The architecture can also employ wireless microphone **24**, which can use a dedicated link in certain implementations. Wireless microphone **24** can be paired (akin to Bluetooth pairing) such that privacy issues can be suitably addressed. Wireless microphone **24** can be taken anywhere (e.g., in the room, in the house, etc.) and still provide appropriate audio functions, where multiplexing would occur at console element **20** for this particular application. Similarly, there could be an incarnation of the same for a given speaker (or the speaker/microphone can be provided together as a mobile unit, which is portable). The speaker could be similarly used anywhere in the room, in the house, etc. It should be noted that this is not only a convenience issue, but also a performance issue in suitably capturing/delivering audio signals having the proper strength and quality.

In terms of call answering and video messaging, handset **28** allows an individual to have the option of taking a voice call instead of answering a videoconferencing call. This is because handset **28** can have the intelligence to operate purely as a mobile phone. For this reason, handset **28** can readily be substituted/replaced by various types of smartphones, which could have an application provisioned thereon for controlling the videoconferencing activities. Handset **28** also affords the ability to be notified (through the handset itself) of an incoming videoconferencing call, with the option of rendering that call on display **12**. A simple visual alert (e.g., an LED, a vibration, etc.) can be used to indicate a video message is waiting to be heard/watched.

The video messaging can include snapshots of video frames that would be indicative of the actual message images. In the user's video Inbox, the current videomail can include images of the actual messages being stored for future playback. For example, if the message were from the user's mother, the videomail would include a series of snapshots of the mother speaking during that videomail. In one particular example, the actual videomail is sampled at certain time intervals (e.g., every 10 seconds) in order to generate these images, which serve as a preview of the videomail message. Alternatively, the snapshots can be limited in number. In other instances, the snapshots are arbitrarily chosen, or selected at the beginning, the middle, and the end of the video message. In other implementations, the snapshots are taken as a percentage of the entire video message (e.g., at the 20% mark, at the 40% mark, and at the 100% mark). In other examples, the videomail in the Inbox is previewed by just showing the image associated with that particular user ID that authored the video message.

In operation of an example involving a user watching a normal television program on display **12**, an incoming call can be received by the videoconferencing platform. The notification can arrive even if the television is off (e.g., through speakers of system **10**). If an individual chooses to answer the call, then the videoconferencing platform takes over the television. In one example involving a digital video recorder (DVR), the programming can be paused. In other examples, the user can keep the call minimized so (for example) a user could speak with a friend while watching a football game. Console element **20** can be configured to record a message, and then send that message to any suitable next destination. For example, the user can send a link to someone for a particular message. The user can also use Flip Share or YouTube technology to upload/send a message to any appropriate destination. In a general sense, the messages can be resident in a network cloud such that they could still be accessed (e.g., over a wireless link) even if the power were down at the residence, or if the user were not at the residence.

The user can also switch from a video call to handset **28**, and from handset **28** back to a video call. For example, the user can initiate a call on a smartphone and subsequently transition it to the videoconferencing display **12**. The user can also do the reverse, where the user starts at the videoconferencing platform and switches to a smartphone. Note that wireless microphone **24** can operate in a certain, preferred range (e.g., 12 to 15 feet), where if the individual moves

further away from that range, users could elect to transition to handset **28** (in a more conventional telephony manner). Consider the case where the room becomes noisy due to family members, and the user on the videoconferencing call elects to simply switch over to a smartphone, to a given landline, etc.

Motion detection can also be used in order to initiate, or to answer video calls. For example, in the case where a remote control is difficult to find in a living room, a simple handwaving gesture could be used to answer an incoming video call. Additionally, the system (e.g., camera element **14** cooperating with console element **20**) can generally detect particular body parts in order to execute this protocol. For example, the architecture can distinguish between a dog running past display **12**, versus handwaving being used to answer an incoming call. Along similar lines, the user can use different gestures to perform different call functions (e.g., clasping his hands to put a call on hold, clapping his hands to end the call, pointing in order to add a person to a contact list, etc.).

Note that Wi-Fi is fully supported by system **10**. In most videoconferencing scenarios, there can be massive amounts of data (much of which is time critical) propagating into (or out of) the architecture. Video packets (i.e., low-latency data) propagating over a Wi-Fi connection can be properly accommodated by system **10**. In one particular example, nonmoving (static) background images can be segmented out of the video image, which is being rendered by display **12**. The architecture (e.g., through console element **20**) can then lower the bit rate significantly on those images. Allocations can then be made for other images that are moving (i.e., changing in some way). In certain example implementations, face-detection algorithms can also be employed, where the video is optimized based on those algorithm results.

Certain phone features allow for handset **28** to offer speed dialing, and a mechanism for saving contacts into a contact list. Calls can be made to users on the speed dial list or the contact list with a single button push on handset **28**. Additionally, calls can be initiated using either the UI of handset **28**, or the on-screen UI **18**. Furthermore, calls can be initiated from a web portal, where the caller can confirm call initiation at the endpoint by pressing voice-only, or a video call button on handset **28**. Also, calls can be initiated from other web pages via a call widget (e.g., calling a person by clicking on his Facebook object). In addition, the caller can look up a recipient in an online directory (e.g., a directory of all Telepresence users stored in a database), place a call to that recipient, and save the recipient's contact information into the contact list. In terms of receiving videoconferencing calls, incoming calls can be accepted with a single button push on handset **28**. Call recipients have the opportunity to accept or reject a call. Rejected calls can be routed to videomail (if permitted by the recipient's safety settings).

In regards to call quality, if the available bandwidth decreases during a call, the video resolution is scaled down, as appropriate. If the available bandwidth increases during a call, the video resolution can be scaled up. An on-screen icon can be provided on display **12** to inform the user of the quality of his videoconferencing experience. The purpose of this information can be to inform the user of a poor experience, potentially being caused by network conditions, and that the user can improve his experience by upgrading his broadband service. When communicating with a Webcam, the picture on display **12** can be windowed inside a black frame: regardless of the actual quality of the Webcam video.

In regards to videomail, when a call cannot be answered in real time, it is not lost, but rather, forwarded automatically to videomail. Videomail can be accessed from the videoconferencing system, a web portal, a smartphone, laptop, or any other suitable endpoint device to be used by a user. Note that the user is afforded the ability to set a designated interval for when an incoming counterparty would be relegated to the user's videomail Inbox. The term 'designated interval' is inclusive of a number of rings, a certain time period (e.g., in seconds), or a zero interval, in which case the counterparty's video call request would be immediately routed to the user's videomail. In certain embodiments, the 'designated interval' has a default configured by an administrator.

Videomail can be stored in the network (e.g., in the cloud) in particular implementations of system **10**. Alternatively, the videomail can be stored locally at the consumer's residence (e.g., at a laptop, a personal computer, an external hard drive, a server, or in any other appropriate data storage device). Videomail can be played with the following minimum set of playback controls: Play, Pause, Stop, Fast or Skip Forward, Fast or Skip Reverse, Go Back to Start. In a particular implementation, videomail is only viewed by the intended recipient. Notifications of new videomail can be sent to other devices by short message service (SMS) text message (e.g., to a mobile device) or by email. An immediate notification can also be shown on handset **28**. For video recordings, videos can be recorded and stored in the network for future viewing and distribution (e.g., as part of video services, which are detailed below with reference FIG. **3**). Calls can similarly be recorded in real time and stored in the network for future viewing and distribution. When sharing recorded videos with videoconferencing users, the architecture can specify exactly which videoconferencing users have access to the video data. When the share list contains one or more email addresses, access control is not enabled in particular implementations (e.g., any individual who has the URL could access the video).

In terms of media sharing, system **10** can provide a simple mechanism for sharing digital photos and videos with removable flash media, flash and hard-drive high definition digital camcorders, digital still cameras, and other portable storage devices. This can be fostered by supporting an external USB connection for these devices to the USB port, which can be provisioned at console element **20**, display **12**, camera element **14**, a proprietary device, or at any other suitable location.

The media sharing application (e.g., resident in console element **20**) supports playback of compressed AV file media that is stored on the USB device. Furthermore, this media sharing can be supported via an external HDMI connection for these devices to the HDMI port. System **10** can also provide a mechanism for sharing digital photos and videos that are on a computer, on a Network Attached Storage (NAS) device, on the local network, etc. The mechanism can be universal plug and play (UPnP)/digital living network alliance (DLNA) renderer compliant. The media sharing application can also provide a mechanism for sharing digital photos and videos that are on either a photo or video sharing site (e.g., Flickr, YouTube, etc.), as discussed herein.

System **10** can also provide a mechanism for viewing broadcast HDTV programs (e.g., watching the Superbowl) with the HDTV set-top box HDMI AV feed displayed in picture-in-picture (PIP) with the call video. Continuing with this example, the Super Bowl broadcast feed can be from a local set-top box **32** and not be shared. Only the call video and voice would be shared in this example. The audio portion of the call can be redirected to handset **28** (e.g., speakerphone by default). The audio from the local TV can be passed through to HDMI and optical links (e.g., TOSlink outputs).

In an example scenario, initially the game video can fill the main screen and the call video could be in the smaller PIP. The

audio for the game can pass through the box to the television, or to AV receiver surround-sound system. The audio for the video call would be supported by handset **28**. In a different scenario, while watching the game, where one caller prefers to switch the main screen from the game to the video call (e.g., during halftime), then the following activities would occur. [Note that this is consistent with the other PIP experiences.] The call video can fill the main screen, where the game fills the smaller PIP window. The audio for the video call can move to the TV or to the AV receiver surround-sound system, and the game audio can switch to handset **28**. Note that none of these activities requires the user to be "off camera" to control the experience: meaning, the user would not have to leave his couch in order to control/coordinate all of these activities.

In one particular example, console element **20** and camera element **14** can support any suitable frame rate (e.g., a 50-60 frames/second (fps) rate) for HD video for local, uncompressed inputs and outputs. Additionally, the video (e.g., the HDMI 1.3 video) can be provided as a digital signal input/output for local, uncompressed inputs and outputs. There is a passthrough for high-bandwidth Digital Content Protection (HDCP) data for local, uncompressed inputs and outputs from HDMI.

In regards to audio support, HDMI audio can be provided as a digital signal input/output. There can also be a stereo analog line-level output to support legacy devices in the environment. This is in addition to a digital audio output, which may be in the form of an optical link output such as a TOSlink output. For the audiovisual switching activities, audio and video can be patched from inputs, videoconferencing video, or other generated sources, to a local full-screen output. The architecture can offer a protocol for automatically turning on and selecting the correct source of the HDTV (along with any external audio system, when the audiovisual configuration allows for this while answering a call). This feature (and the other features of handset **28**) can be implemented via infrared, Bluetooth, any form of the IEEE 802.11 protocol, HDMI-Consumer Electronics Control (CEC), etc.

In regards to camera element **14**, the architecture can provide a full-motion video (e.g., at 30 fps). Participants outside of the range may be brought into focus via autofocus. Camera element **14** can provide identification information to console element **20**, a set-top satellite, and/or any other suitable device regarding its capabilities. Camera element **14** can be provisioned with any suitable pixel resolution (e.g., 1280×720 pixel (720 p) resolution, 1920×1080 pixel (1080 p) resolution, etc.). If depth of focus is greater than or equal to two meters, then manual focus can be suggested for setup activities, and the autofocus feature/option would be desirable for the user. In operation, the user can manually focus camera element **14** on his sofa (or to any other target area) during setup. If successful, this issue would not have to be revisited. If depth of focus is less than or equal to one meter (which is commonly the case) then autofocus can be implemented. A digital people-action finder may also be provisioned for system **10** using camera element **14**. Both pan and tilt features are available manually at setup, and during a video call. Similarly, zoom is available manually at setup time, and during a video call.

Handset **28** may be equipped with any suitable microphone. In one particular implementation, the microphone is a mono-channel mouthpiece microphone optimized for capturing high quality audio in a voice range. The microphone may be placed to optimize audio capture with standard ear-mouth distance. Handset **28** can have a 3.5 mm jack for a headphone with microphone. Note that system **10** can support Home Network Administration Protocol (HNAP) and, further, be compatible with Network Magic, Linksys Easy-Link Advisor, or any other suitable home network management tool.

In one example, handset **28** has an infrared transmitter for controlling standard home theatre components. The minimum controls for handset **28** in this example can be power-on, input select, volume up/down, and audio output mute of the TV and AV receiver. Console element **20** (along with camera element **14**) can have an infrared receiver to facilitate pairing of the videoconferencing system with other remote controls, which can allow other remotes to control the videoconferencing system. Suitable pairing can occur either by entering infrared codes into handset **28**, or by pointing a remote from the target system at an infrared receiver of the videoconferencing system (e.g., similar to how universal remotes learn and are paired).

For call management, system **10** can allow a user to initiate, accept, and disconnect calls to and from voice-only telephones (e.g., using handset **28** in a voice-only mode). Call forwarding can also be provided such that video calls are forwarded between console elements **20** at each endpoint of the video session. Additionally, announcements can be provided such that a default announcement video can be played to callers who are leaving a videomail. A self-view is available at any time, and the self-view can be triggered through a user demand by the user pressing a button on handset **28**. The self-view can be supported with a mirror mode that shows the reverse image of the camera, as if the user was looking in a mirror. This can occur at any time, including while idle, while on a videoconferencing call, while on an audio-only call, etc.

FIG. **3** is a simplified block diagram illustrating one potential operation associated with system **10**. In this particular implementation, console element **20** is provisioned with a VPN client module **44**, and a media module **46**. Console element **20** is coupled to a home router **48**, which can provide connectivity to another videoconferencing endpoint **50** via a network **52**. Home router **48** can also provide connectivity to a network that includes a number of video services **56**. In this example, video services **56** include a consumer database **58**, a videomail server **60** a call control server **62**, a web services **64**, and a session border controller **66**.

Any number of traffic management features can be supported by system **10**. In a simple example, system **10** can allow a point-to-point connection to be made between two home video conferencing systems. A connection can also be made between a home video conferencing system and an enterprise videoconferencing system. The packets associated with the call may be routed through a home router, which can direct the packets to an exchange or a gateway in the network. The consumer endpoint does not need to support the second data channel; any shared content can be merged into the main data stream. A multipoint connection can be made between a combination of three or more home and enterprise videoconferencing systems.

In operation, the VPN is leveraged in order to transmit administrative and signaling traffic to the network. Additionally, the media data (e.g., voice and video) can be exchanged outside of that link (e.g., it can be provisioned to flow over a high bandwidth point-to-point link). This linking can be configured to protect administrative and signaling traffic (which may be inclusive of downloads), while simultaneously conducting high-speed data communications over the point-to-point pathway.

In the particular example of FIG. **3**, secure signaling and administrative data is depicted as propagating between home router **48** and video services **56**. A number of VPN ports are also illustrated in FIG. **3**. The ports can be associated with any

appropriate security protocol (e.g., associated with IPsec, secure socket layer (SSL), etc.). Additionally, media data can propagate between network **52** and home router **48**, where RTP ports are being provisioned for this particular exchange involving a counterparty endpoint **50**. Semantically, multiple pathways can be used to carry the traffic associated with system **10**. In contrast to other applications that bundle their traffic (i.e., provide a single hole into the firewall), certain implementations of system **10** can employ two different pathways in the firewall: two pathways for carrying two different types of data.

The objects within video services **56** are network elements that route or that switch (or that cooperate with each other in order to route or switch) traffic and/or packets in a network environment. As used herein in this Specification, the term 'network element' is meant to encompass servers, switches, routers, gateways, bridges, loadbalancers, firewalls, inline service nodes, proxies, processors, modules, or any other suitable device, component, element, or object operable to exchange information in a network environment. This network element may include any suitable hardware, software, components, modules, interfaces, or objects that facilitate the operations thereof. This may be inclusive of appropriate algorithms and communication protocols that allow for the effective exchange (reception and/or transmission) of data or information.

Note that videomail server **60** may share (or coordinate) certain processing operations between any of the elements of video services **56**. Using a similar rationale, their respective memory elements may store, maintain, and/or update data in any number of possible manners. In one example implementation, videomail server **60** can include software to achieve the video processing applications involving the user, as described herein. In other embodiments, these features may be provided externally to any of the aforementioned elements, or included in some other network element to achieve this intended functionality. Alternatively, several elements may include software (or reciprocating software) that can coordinate in order to achieve the operations, as outlined herein. In still other embodiments, any of the devices of the FIGURES may include any suitable algorithms, hardware, software, components, modules, interfaces, or objects that facilitate these switching operations.

In certain instances, videomail **60** can be provisioned in a different location, or some other functionalities can be provided directly within the videoconferencing platform (e.g., within console element **20**, camera element **14**, display **12**, etc.). This could be the case in scenarios in which console element **20** has been provisioned with increased intelligence to perform similar tasks, or to manage certain repositories of data for the benefit of the individual user.

FIG. **4** is a simplified block diagram illustrating additional details associated with call signaling and call media. In this particular instance, the call media links are provided in broken lines, whereas the call signaling links are provided as straight-lines. More specifically, call signaling propagates from a set of endpoints **74***a-b* over a broadband network, where these links have a suitable connection at video services **56**. These links are labeled **70***a-b* in the example of FIG. **4**. Video services **56** include many of the services identified previously with respect to FIG. **3**. Call media between endpoints **74***a-b* propagate over the broadband network, where these links are identified as **72***a-b*. Endpoints **74***a-b* are simply videoconferencing entities that are leveraging the equipment of system **10**.

FIGS. **5-13** are simplified screenshots illustrating certain features associated with a user interface to be used in conjunction with conducting a video session. FIG. **5** illustrates a user interface **75** that can be rendered on a given video display. In this particular instance, the phone icon is selected such that a video call can be initiated, or received. FIG. **6** illustrates how user interface **75** can signal that videomail is present for a given user. Additionally, it should be noted that the envelope icon has been highlighted in this example to indicate that there is a video message waiting to be accessed by the user.

FIGS. **7-8** illustrate certain submenus **76** and **78** of user interface **75**. Submenu **76** is associated with device settings and preferences, whereas submenu **78** is associated with recording video and reviewing current videos. Note that these submenus can be accessed by simply manipulating a remote control (i.e., a handset) for the home user interface **75** (e.g., in up, down, left, and right directions). FIG. **9** illustrates a graphic **80** for answering an incoming video call. As the call comes into the system, the user can elect to ignore the call, or to answer the call using the handset, using user interface **75** (as discussed previously). FIG. **10** illustrates a graphic **82** associated with how a user can access his contacts to initiate video calls. FIG. **11** illustrates a graphic **84**, which allows the user can use to add new contacts to his video system. FIG. **12** illustrates a graphic **86** associated with forwarding, deleting, playing, editing, etc. video messages. FIG. **13** illustrates a graphic **88** associated with a video message being played by the user. A time expiration parameter is provided within graphic **88**. Note that the video message can be rewound, fast-forwarded, paused, etc. through manipulation of graphic **88**.

FIG. **14** is a simplified block diagram illustrating one possible implementation of a console element **100**. Console element **100** is similar to console element **20** (of FIG. **1**); however, in this instance, console element **100** has certain additional enhancements associated with rendering curved edges on a given display during a video session. Console element **100** may include a processor **102**, a memory element **104**, an opacity mask module **106**, and a chroma-key module **108**. The elements within console element **100** may cooperate in order to achieve the enhanced video operations (e.g., associated with opacity masks, chroma-key processing, etc.), as discussed below.

Turning to specific details associated with the chroma-key anti-aliasing activities, most consumer products cover a full screen that provides a canvas on which any suitable graphic could be provided. Given the block pixel nature of high-definition televisions, creating a smooth curve on top of passthrough video is difficult. Typically, when full-screen products seek to show a menu, blunt box-like shapes are shown. Moreover, the resultant typically looks jagged, and does not show a smooth curve. In contrast to these products, the user interface graphic (shown in a clover shape) is a noninvasive passthrough user interface, which is rendered with smooth rounded edges for the user. To achieve the smooth rounded edge presentation, the architecture of the present disclosure can apply two techniques: chroma-keying and anti-aliasing. Chroma-keying in this context refers to using a specific Red, Blue, and Green (RGB) color, and designating it to represent a passthrough color to the underlying video. This naturally aligns with how blue-screen and green-screen visual effects generally operate.

FIG. **15** is a simplified block diagram illustrating an example of a button stretch. FIG. **15** includes a series of images **90***a-c*, which collectively demonstrate how the system can resize the width of buttons of the user interface. This is done because of the desire to dynamically stretch rounded

buttons to fit variable length text (e.g., while translating text to foreign languages), while maintaining the same curve radius of the original button graphic.

FIG. **16** is a simplified block diagram illustrating anti-aliasing images **91***a-b*. In this case, image **91***a* depicts a yellow circle over a red signal with no anti-aliasing present. Image **91***b* depicts a yellow circle over a red signal with anti-aliasing being applied. More generally, these images demonstrate how anti-aliasing operates, whereby the yellow circle with a black outline appears jagged (on image **91***a*) and then becomes a more smoothed curve (shown in image **91***b*) as a result of the blending of the red passthrough video with a transparent black pixel.

FIG. **17** is a simplified block diagram illustrating a set of images **92***a-c*, which depicts the use of multiple chroma-key colors. In this case, the chroma-key colors are green and blue on top of passthrough video pixels (red), whereby green pixels are 100% transparent (to reveal the full red in image **92***b*) and blue pixels are only 50% transparent (to reveal darkened red in image **92***c*). This produces a seemingly smoother curve that is better than existing structures that simply use one single chroma-key color (green) to show video (which results in a jagged curve).

In operational terms, a processor (e.g., processor **102**, a field programmable gate array (FPGA), etc.) evaluates every pixel in the user interface of the display. When the processor detects the chroma-color being used for a pixel, it replaces the pixel with background video instead of the user interface color. The user interface would still be left looking jagged (even though an attempt is being made to depict a curve). The architecture accommodates this issue by specifying another chroma-key color: one that represents background video being darkened by some percentage (e.g. 50%). Subsequently, the system can change the artwork for the curved user interface and, in addition to the original passthrough color, the system can drop the second chroma-key color in between the steps of the jagged curve. This allows the 50% darkened video to blend more gently into the user interface: resulting in the illusion of a smoother curve. The more chroma-key colors being specified, the more the system can anti-alias the curve to appear smoother. Note that there should be some limit in specifying chroma-keys because exhausting this parameter can encroach on the number of colors allowed to be used in the user interface. This is because each color can represent either a UI pixel color, or a background video (i.e., a color darkened to a specified amount).

FIG. **18** is a simplified flowchart **200** illustrating an example flow associated with multi-chroma-key anti-aliasing. The method may begin at step **210**, where a processor begins receiving video data. The video data input can be from a camera element or any other suitable video source (e.g., a cable box, a DVR, a game console, a Blue-Ray/DVD player, etc.). The processor is configured to cycle through all of the pixels (i.e., from left to right, and from top to bottom) of the display, as shown in step **220**. For each pixel, a determination is made to identify if that particular pixel color (reflected by the RGB value) matches a specifically-designated value for chroma-key operations. This is reflected by step **230**. For example, if the pixel matches that designated color (e.g., 255), that pixel of source video would be shown at 100% clear. If there were not a match, meaning that the color is at 251-254 on the RGB scale, then the passthrough video would be shown darkened by some percentage (e.g., 20%). This is illustrated by step **240**. Any other values (i.e., 0-250) being identified would result in no passthrough video being shown and, instead, the pixel would be rendered from the source graphic. This is illustrated by step **250**.

Hence, an initial determination is made to identify a match for the pixel. Where a match is found, a determination is made as to how much to darken the passthrough video signal for that particular pixel. The color itself (i.e., the RGB values) would dictate the darkening parameter in certain example implementations. This allows the architecture to selectively darken a pixel of video in order to smooth a rounded edge on a given display of the video session.

Turning to the operations associated with the opacity render mask, certain aspects of the present disclosure can offer additional enhancements for smoothing edges in video processing. For high-definition televisions, images are generally composed of square pixels that have a color definition specified by a certain amount of Red, Blue, and Green color (RGB). To achieve the smooth rounded button effect in the user interface, the architecture can leverage an extra parameter known as Alpha: resulting in an RGBA color value for a specific pixel. Each parameter can have 256 possible values, from 0 to 255. An RGB value of (0, 0, 0) is pure black, whereas a value of (255,255,255) is pure white. A value of (255,0,0) is pure red whereas a value of (0,0,255) is pure blue. An alpha value of 0 is completely transparent, and a value of 255 is completely opaque.

To present a smooth curved user interface on a given display during the video session, the architecture initially creates the rounded graphics with anti-aliased images. Stated in different terminology, the curves can be smoothed with pixels that are partially transparent. The amount of transparency can be specified by the Alpha value for that pixel. These partially transparent pixels can blend with the pixel color of the passthrough television source behind the user interface.

When it is time to draw/render the user interface on the screen, the rendering code creates a grayscale version of the user interface. This grayscale version of the user interface is created by checking the Alpha value for each pixel in the user interface. If the Alpha value is 0 for a pixel, the grayscale image contains a black pixel. Where the Alpha value is 255 for a pixel, the grayscale image contains a white pixel. This is achieved by creating a new image (called an opacity mask) and setting its RGB values equal to the Alpha value of the source image for every pixel in the source image. In other words, the architecture can begin at the top-left corner of the source user interface image and move to the pixels from left to right, and from top to bottom. The RGBA color for that initial pixel is ascertained (e.g., 128,32,192,255), and the system can set the RGB values (for the same pixel in the new image) to the Alpha value of the source image, in this case (255,255, 255), which is completely white.

After the new grayscale image is created, a processor can set pixel X,Y (0,0) to a color value of RGBA (0,0,0,0). This indicates to the processor that the opacity mask has been created. The processor is constantly evaluating the user interface graphics for a color of (0,0,0,0) in position (0,0). When it sees this value, it knows that this image is an opacity mask and that it should not render it to the screen. Instead, the processor (e.g., an FPGA) uses this image as an opacity mask to mix the source video with the user interface. Each pixel that is black (0,0,0) would show the passthrough video completely. Any pixel that is white (255,255,255) would show no video: only the solid UI pixel color. Additionally, every pixel that has a value in between these boundaries would cause the processor to mix the pixel color of the source video with the pixel color of the user interface. After a frame of video is mixed together, it is sent out to the television for display. The viewer would not see the grayscale render mask: only the resulting picture of the source video mixed with the user interface on top.

Note that in certain example implementations, the video processing functions outlined herein may be implemented by logic encoded in one or more tangible media (e.g., embedded logic provided in an application specific integrated circuit [ASIC], digital signal processor [DSP] instructions, software [potentially inclusive of object code and source code] to be executed by a processor, or any other similar machine, etc.). In some of these instances, a memory element [as shown in FIG. **14**] can store data used for the video enhancement operations described herein (e.g., involving opacity masks, chroma-keys, etc.). This includes the memory element being able to store software, logic, code, or processor instructions that are executed to carry out the activities described in this Specification. A processor can execute any type of instructions associated with the data to achieve the operations detailed herein in this Specification. In one example, the processor [as shown in FIG. **14**] could transform an element or an article (e.g., data) from one state or thing to another state or thing. In another example, the video enhancement activities outlined herein may be implemented with fixed logic or programmable logic (e.g., software/computer instructions executed by a processor) and the elements identified herein could be some type of a programmable processor, programmable digital logic (e.g., FPGA, an erasable programmable read only memory (EPROM), an electrically erasable programmable ROM (EEPROM)) or an ASIC that includes digital logic, software, code, electronic instructions, or any suitable combination thereof.

Note that the equipment of FIG. **14** may share (or coordinate) certain processing operations. Using a similar rationale, their respective memory elements may store, maintain, and/or update data in any number of possible manners. In a general sense, the arrangements depicted in the preceding FIGURES may be more logical in their representations, whereas a physical architecture may include various permutations/combinations/hybrids of these elements. In one example implementation, console elements **20**, **100** include software (e.g., as part of the modules of FIG. **14**) to achieve the video enhancement operations, as outlined herein in this document. In other embodiments, these features may be provided externally to any of the aforementioned elements (e.g., included in camera element **14**), or included in some other device to achieve these functionalities. Alternatively, several elements may include software (or reciprocating software) that can coordinate in order to achieve the operations, as outlined herein. In still other embodiments, any of the devices of the FIGURES may include any suitable algorithms, hardware, software, components, modules, interfaces, or objects that facilitate these video enhancement operations.

All of the aforementioned devices may further keep information in any suitable memory element (e.g., random access memory (RAM), ROM, EPROM, EEPROM, ASIC, etc.), software, hardware, or in any other suitable component, device, element, or object where appropriate and based on particular needs. Any of the memory items discussed herein (e.g., database, table, key, queue, etc.) should be construed as being encompassed within the broad term 'memory element.' Similarly, any of the potential processing elements, modules, and machines described in this Specification should be construed as being encompassed within the broad term 'processor.' Console elements **20**, **100** and/or camera element **14** can also include suitable interfaces for receiving, transmitting, and/or otherwise communicating data or information in a network environment.

Note that with the examples provided herein, interaction may be described in terms of two, three, or four elements. However, this has been done for purposes of clarity and example only. In certain cases, it may be easier to describe one or more of the functionalities of a given set of flows by only referencing a limited number of elements. It should be appreciated that system **10** (and its teachings) are readily scalable and can accommodate a large number of components, as well as more complicated/sophisticated arrangements and configurations. Accordingly, the examples provided should not limit the scope or inhibit the broad teachings of system **10** as potentially applied to a myriad of other architectures.

It is also important to note that the steps in the preceding flow diagrams illustrate only some of the possible signaling scenarios and patterns that may be executed by, or within, system **10**. Some of these steps may be deleted or removed where appropriate, or these steps may be modified or changed considerably without departing from the scope of the present disclosure. In addition, a number of these operations have been described as being executed concurrently with, or in parallel to, one or more additional operations. However, the timing of these operations may be altered considerably. The preceding operational flows have been offered for purposes of example and discussion. Substantial flexibility is provided by system **10** in that any suitable arrangements, chronologies, configurations, and timing mechanisms may be provided without departing from the teachings of the present disclosure.

Although the present disclosure has been described in detail with reference to particular arrangements and configurations, these example configurations and arrangements may be changed significantly without departing from the scope of the present disclosure. For example, although the present disclosure has been described with reference to particular communication exchanges involving certain server components, system **10** may be applicable to other protocols and arrangements (e.g., those involving any type of videoconferencing scenarios). Additionally, although camera element **14** has been described as being mounted in a particular fashion, camera element **14** could be mounted in any suitable manner in order to suitably capture video images. Other configurations could include suitable wall mountings, aisle mountings, furniture mountings, cabinet mountings, upright (standing) assemblies, etc., or arrangements in which cameras would be appropriately spaced or positioned to perform its functions.

Furthermore, the users described herein are simply individuals within the proximity, or within the field of view, of display **12**. Audience members can be persons engaged in a video conference involving other individuals at a remote site. Audience members can be associated with corporate scenarios, consumer scenarios, residential scenarios, etc. or associated with any other suitable environment to which system **10** may be applicable.

Moreover, although the previous discussions have focused on videoconferencing associated with particular types of endpoints, handheld devices that employ video applications could readily adopt the teachings of the present disclosure. For example, iPhones, iPads, Google Droids, personal computing applications (i.e., Desktop video solutions), etc. can readily adopt and use the enhanced video processing operations detailed above. Any communication system or device that encodes or renders video data would be amenable to the video features discussed herein. Numerous other changes, substitutions, variations, alterations, and modifications may be ascertained to one skilled in the art and it is intended that the present disclosure encompass all such changes, substitutions, variations, alterations, and modifications as falling within the scope of the appended claims.

Additionally, system **10** can involve different types of counterparties, where there can be asymmetry in the technologies being employed by the individuals. For example, one user may be using a laptop, while another user is using the architecture of system **10**. Similarly, a smartphone could be used as one individual endpoint, while another user continues to use the architecture of system **10**. Also, Webcams can readily be used in conjunction with system **10**. Along similar lines, multiparty calls can readily be achieved using the teachings of the present disclosure. Moreover, although system **10** has been illustrated with reference to particular elements and operations that facilitate the communication process, these elements and operations may be replaced by any suitable architecture or process that achieves the intended functionality of system **10**.

What is claimed is:

1. A method, comprising:

receiving a video input from a video source coupled to a display;

identifying a user interface to be displayed on the display and over the video input, wherein the user inference includes a stepped curved edge;

generating an opacity mask to mix the video input with the user interface by setting red, green, blue (RGB) values, for pixels in the user interface, equal to an alpha value; and

using a darkening parameter on a pixel in the user interface if a particular RGB value of the pixel matches a specifically-designated value for chroma-key operations, wherein a first group of pixels in the user interface have a first opacity level and a first chroma-key color, wherein the first opacity level is transparent or near transparent to allow the video input to be displayed on the display, and wherein a second group of pixels in the user interface have a second opacity level and a second chroma-key color, wherein the second group of pixels are located between steps of the stepped curved edge of the user interface, wherein the second opacity level is less than the first opacity level and the second opacity level darkens the video input to be displayed on the display but still allows the video input to be displayed on the display.

2. The method of claim **1**, further comprising:

generating a grayscale element associated with the user interface by evaluating alpha values related to pixels associated with the video input, wherein the grayscale element is generated by evaluating an alpha value for each pixel associated with the user interface.

3. The method of claim **1**, wherein if a particular alpha value of a particular pixel is 0, then a portion of an associated grayscale image contains a black pixel.

4. The method of claim **1**, wherein if a particular alpha value of a particular pixel is 255, then a portion of an associated grayscale image contains a white pixel.

5. The method of claim **1**, further comprising:

setting a selected pixel to a certain color in red, green, blue, alpha (RGBA) values to indicate to a processor element a presence of the opacity mask.

6. The method of claim **1**, further comprising:

evaluating graphics associated with the user interface for a RGBA color to determine whether to render the graphics on the display.

7. The method of claim **1**, wherein certain images are used as part of the opacity mask to mix source video with the user interface, and wherein pixels in the opacity mask determined to be black show passthrough video on the display, pixels in the opacity mask determined to be white show solid user interface pixel color on the display, and each pixel in the opacity mask that is not determined to be black or white is mixed with a corresponding pixel in the source video and a corresponding pixel in the user interface.

8. Logic encoded in one or more tangible non-transitory media that includes code for execution and when executed by a processor operable to perform operations comprising:

receiving a video input from a video source coupled to a display;

identifying a user interface to be displayed on the display and over the video input, wherein the user inference includes a stepped curved edge;

generating an opacity mask to mix the video input with the user interface by setting red, green, blue (RGB) values, for pixels in the user interface, equal to an alpha value of a source image for certain pixels in the source image; and

using a darkening parameter on a pixel in the user interface if a particular RGB value of the pixel matches a specifically-designated value for chroma-key operations, wherein a first group of pixels in the user interface have a first opacity level and a first chroma-key color, wherein the first opacity level is transparent or near transparent to allow the video input to be displayed on the display, and wherein a second group of pixels in the user interface have a second opacity level and a second chroma-key color, wherein the second group of pixels are located between steps of the stepped curved edge of the user interface, wherein the second opacity level is less than the first opacity level and the second opacity level darkens the video input to be displayed on the display but still allows the video input to be displayed on the display.

9. The logic of claim **8**, the operations further comprising:

generating a grayscale element associated with the user interface by evaluating alpha values related to pixels associated with the video input, wherein the grayscale element is generated by evaluating an alpha value for each pixel associated with the user interface.

10. The logic of claim **8**, wherein if a particular alpha value of a particular pixel is 0, then a portion of an associated grayscale image contains a black pixel.

11. The logic of claim **8**, wherein if a particular alpha value of a particular pixel is 255, then a portion of an associated grayscale image contains a white pixel.

12. The logic of claim **8**, the operations further comprising:

setting a selected pixel to a certain color in red, green, blue, alpha (RGBA) values to indicate to a processor element a presence of the opacity mask.

13. The logic of claim **8**, the operations further comprising:

evaluating graphics associated with the user interface for a RGBA color to determine whether to render the graphics on the display.

14. The logic of claim **8**, wherein certain images are used as part of the opacity mask to mix source video with the user interface, and wherein pixels determined to be black show passthrough video on the display, and pixels determined to be white show solid user interface pixel color on the display.

15. An apparatus, comprising:

a memory element configured to store data; and

a processor operable to execute instructions associated with the data, wherein the processor and the memory element cooperate such that the apparatus is configured to:

receive a video input from a video source coupled to a display;

identify a user interface to be displayed on the display and over the video input, wherein the user inference includes a stepped curved edge;

generate an opacity mask by setting red, green, blue (RGB) values, for pixels in the user interface, equal to an alpha value of a source image for certain pixels in the source image; and

use a darkening parameter on a pixel in the user interface if a particular RGB value of the pixel matches a specifically-designated value for chroma-key operations, wherein a first group of pixels in the user interface have a first opacity level and a first chroma-key color, wherein the first opacity level is transparent or near transparent to allow the video input to be displayed on the display, and wherein a second group of pixels in the user interface have a second opacity level and a second chroma-key color, wherein the second group of pixels are located between steps of the stepped curved edge of the user interface, wherein the second opacity level is less than the first opacity level and the second opacity level darkens the video input to be displayed on the display but still allows the video input to be displayed on the display.

16. The apparatus of claim **15**, the apparatus being further configured to:

generate a grayscale element associated with the user interface by evaluating alpha values related to pixels associated with the video input, wherein the grayscale element is generated by evaluating an alpha value for each pixel associated with the user interface.

17. The apparatus of claim **15**, wherein if a particular alpha value of a particular pixel is 0, then a portion of an associated grayscale image contains a black pixel.

18. The apparatus of claim **15**, wherein if a particular alpha value of a particular pixel is 255, then a portion of an associated grayscale image contains a white pixel.

19. The apparatus of claim **15**, the apparatus being further configured to:

setting a selected pixel to a certain color in red, green, blue, alpha (RGBA) values to indicate to a processor element a presence of the opacity mask.

20. The apparatus of claim **15**, further comprising:

a handset configured to control the user interface during a video session.

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